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New Frontiers in Multifunctional Material Science and Processing

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The Ho_2O_3 Concentration Influence on BaTiO_3 – ceramics Fractal Structures

D. Sirmić¹, M. Cvetanović¹, F. Bastić¹, V. Mitić^{1,2}, Lj. Kocić¹, S. Janković³,
V. Paunović¹, M. Miljković⁴

¹*University of Niš, Faculty of Electronic Engineering, Niš, Serbia*

²*Institute of Technical Sciences of SASA, Belgrade, Serbia*

³*Mathematical Institute of SASA, Belgrade, Serbia*

⁴*University of Nis, Center for Electron Microscopy, Nis, Serbia*
sirmicdaniel@yahoo.co.uk

An influence of dopant concentration on microstructure and dielectric properties of doped BaTiO_3 -ceramics is developed based on fractal geometry. Using different technological parameters and different additives the structure of BaTiO_3 based ceramics materials can be controlled.

In this research, BaTiO_3 samples with different concentration of Ho_2O_3 are used. The ratio of dopant concentration ranges from 0.05% to 1%. The sintering temperature of 1350°C is chosen. Selected specimens of BaTiO_3 were documented using SEM (Scanning Electron Microscope) equipped with EDS analysis. As it is expected, the influence of impurities on intergranular capacity and other electrical properties is significant which is demonstrated and confirmed in this paper. Using the method of fractal modeling, a reconstruction of microstructure configurations, like grains shapes or intergranular contacts is performed.

Such interdisciplinary research is important for opening new frontiers in electronics, and give us a fine perspective in dielectric materials. A merit of such perspective is definition of a bond between microelectronics and materials and components made for sensors and actuators.

Keywords: BaTiO_3 -ceramics, doped ceramics, fractal structure.